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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/560,488	12/12/2005	Gerald Lucovsky	5051-639	3119

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EXAMINER	
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ART UNIT	PAPER NUMBER
2826	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/560,488	LUCOVSKY ET AL.	
	Examiner	Art Unit	
	BENJAMIN P. SANDVIK	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20 and 33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20 and 33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 1-20 and 33 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 6-10, 14-16, 18, 20, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buchanan et al (U.S. PG Pub #2002/0197789), in view of Yao (U.S. Patent #6679996).

With respect to **claims 1, 3, 4, 7-9**, Buchanan teaches a semiconductor substrate (Fig. 2D, 10); a first oxide layer on the semiconductor substrate (Fig. 2D, 12), the first oxide layer comprising an element from the semiconductor substrate (Paragraphs 29 and 33, silicon); a second oxide layer on the first oxide layer opposite the semiconductor substrate (Fig. 2D, 14), the second oxide layer comprising a stoichiometric, single-phase complex oxide represented by the formula: ABO (Paragraph 46), but does not teach that h=j; or that A is an element of the lanthanide rare earth elements of the periodic table or the trivalent

elements from cerium to lutetium; and B is an element of the transition metal elements of groups IVB or VB of the periodic table.

Yao teaches forming an insulating (Col 16 Ln 9) ABO metal oxide, wherein A is an element of the lanthanide rare earth elements, and B is an element of the transition metal groups IVB or VB, and h=j (Col 4 Ln 54-67 and the examples of Col 5 Ln 1-25). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an ABO oxide taught by Yao in the device of Buchanan in order to reduce a high temperature heat treatment during formation steps (Col 2 Ln 20-22) to avoid shrinkage of the metal oxide layer (Col1 Ln 38-45).

With respect to **claim 2**, Buchanan teaches that the thickness of the second oxide layer is less than 15 nm (Paragraph 44).

With respect to **claim 6**, Buchanan teaches that B is an element with 3d, 4d or 5d electrons available for bonding to oxygen, and wherein A is an element in which one 5d electron is available for bonding (Paragraphs 46/47).

With respect to **claim 10**, Buchanan teaches that the substrate comprises a material selected from the group consisting of a Group III-V binary alloy, a Group III-V quaternary alloy, a Group III-nitride alloy, and combinations thereof (Paragraph 29).

With respect to **claim 14**, Buchanan teaches that the substrate comprises a material selected from the group consisting of silicon (Si), germanium (Ge),

silicon carbide (SIC), gallium nitride (GaN), gallium arsenide (GaAs), and combinations thereof (Paragraph 29).

With respect to **claim 15**, Buchanan teaches a SOI substrate (Paragraph 29).

With respect to **claim 16**, Buchanan teaches that the first oxide layer comprises a nitrided silicon dioxide (Paragraph 34).

With respect to **claim 18**, Buchanan teaches that the device comprises a field effect transistor (Paragraph 28).

With respect to **claim 20**, Buchanan teaches a high electron mobility transistor (Paragraphs 8 and 12).

With respect to **claim 33**, Buchanan teaches that the second oxide layer is non-crystalline (Paragraph 46).

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Buchanan and Yao, in view of Ahn et al (U.S. PG Pub #2003/0045060).

With respect to **claim 5**, Buchanan does not teach that the second oxide has an equivalent oxide thickness of about 0.5 to 1.6 nm. Ahn teaches gate oxides formed with equivalent oxide thicknesses of less than 2 nm (Paragraph 37). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the second oxide of Buchanan with an EOT of 0.5 to 1.6 nm based on the teachings of Ahn in order to make the oxide more uniform and easier to process.

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buchanan and Yao, in view of Umemoto et al (U.S. Patent #5132752).

With respect to **claims 11-12**, Buchanan does not teach that the substrate comprises a Group InGaAs or InGaAsP. Umemoto teaches a substrate for a FET comprising InGaAs or InGaAsP (Col 10 Ln 23-30). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the substrate of Buchanan of InGaAs or InGaAsP as taught by Umemoto to suppress the carrier multiplication effect in the device.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Buchanan and Yao, in view of Takahashi et al (U.S. Patent #6207976).

With respect to **claim 13**, Buchanan does not teach that the substrate comprises a Group III-nitride alloy selected from the group consisting of (Ga,Al)N, (Ga, In)N, (Al,In)N, (Ga,Al,In)N, and combinations thereof. Takahashi teaches a substrate for a FET comprising InGaN (Col 8 Ln 38-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the substrate of Buchanan of InGaN as by Takahashi in order to achieve the predictable result of a substrate with a suitable conductivity for semiconducting functions.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Buchanan and Yao, in view of Gardner et al (U.S. Patent #6140167).

With respect to **claim 17**, Buchanan does not teach that the first oxide layer contributes less than about 0.5 nm of oxide-equivalent capacitance to the FET. Gardner teaches a gate dielectric having an oxide-equivalent capacitance of less than about 0.5 nm (Col 9 Ln 20-24). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the first oxide with an equivalent capacitance thickness as taught by Gardner in order to allow for a greater actual thickness of the oxide.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Buchanan and Yao, in view of Cantarini et al (U.S. PG Pub #2001/0013627).

With respect to **claim 19**, Buchanan does not teach that the device comprises a photovoltaic device. Cantarini teaches a MOSFET device that comprises a photovoltaic device (Paragraph 13). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a photovoltaic device with the device of Buchanan as taught by Cantarini in order to provide a "turn-on" signal for the MOSFET.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENJAMIN P. SANDVIK whose telephone number is (571)272-8446. The examiner can normally be reached on Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on 571-272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/B. P. S./
Examiner, Art Unit 2826

/Sue A. Purvis/
Supervisory Patent Examiner, Art Unit 2826